

4.1 Earth Chemistry

- I. Matter

A. Scientists use the word matter to describe the substance of objects

B. The amount of matter in an object is the object's mass

II Properties of Matter

A. Physical Properties are characteristics of a substance that can be observed without changing the object's composition (color, shape, density)

B. Chemical properties are characteristics that describe how a substance reacts with another substance to produce a new substance

example: 1. iron reacting with oxygen to form rust

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III Elements - cannot be broken down into simpler substances

A. Each element has a characteristic set of physical and chemical properties that can be used to identify it

1. Every element is represented by a symbol of one to two (sometimes three) letters

2. More than 90 elements occur naturally on Earth

B. Atoms - elements consist of atoms

1. Atoms cannot be broken down into smaller particles that have the same properties

IV Atomic Structure

A. Atoms are made up of subatomic particles: protons, neutrons, electrons

B. The nucleus

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1. The nucleus contains protons + neutrons

C. Electron Cloud

1. Electrons are in the space surrounding the nucleus known as the electron cloud

2. Opposite charges of electrons + protons is what holds the atom together

IV Atomic number

A. The number of protons in the nucleus = atomic #

V Atomic Mass

A. protons + neutrons = ^{atomic} mass number

1. units = amu (atomic mass units)

a. protons + neutrons = 1 amu

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VII Isotopes - elements with different amounts of neutrons in their nucleus

A. Each isotope has slightly different properties

VIII Valence Electrons and Periodic Properties

A. Periodic table

1. Groups = vertical columns

2. periods = horizontal rows

B. Chemical properties are largely determined by valence electrons

C. Elements with one-three valence electrons tend to lose their electrons easily

D. Elements with four-seven electrons want to want to gain

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4.2 Combinations of Atom

→ Element rarely occur only as a single element in Earth's crust, they generally occur as a compound

I. Molecules

A. In a molecule, atoms are chemically bonded together

1. Some elements occur naturally as diatomic molecules ex: O_2

II Chemical Formulas - a combination of letters and numbers that shows which element make up a compound

A. H_2O = chemical formula for water

III Chemical Equations

A. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

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B. Equation Structure

1. Reactants → products

C. Balanced Equations

1. To balance an equation you must put coefficients (number) in front of chemical formulas
a. This means there are 4 H atoms in $2H_2O$

IV Chemical Bonds - forces that hold molecules together

A. Atoms form chemical bonds by either sharing or transferring valence electrons (electrons in outer shell)

B. Ions - attractive force between oppositely charged ions ⇒ forms ionic bonds → $Na^+ + Cl^- \rightarrow NaCl$

C. Covalent Bonds - bonds between atoms that share electrons ex: Cl_2 or H_2O

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D. Polar Covalent - covalent bond in which bonded atoms have an equal attraction for shared electrons ex: H_2O

V Mixtures - combination of two or more substances that are not chemically combined

A. Homogenous - have same composition + properties throughout

1. Uniformly dispersed substances are solutions

B. Heterogeneous - not uniformly distributed

1. Granite is a heterogeneous mixture of minerals

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Chapter 4 Review

Grade: 8th/9th

Subject: Earth Science

Date: 11/14

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1 A negatively charged subatomic particle

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2 Chemical properties are characteristics that can be observed without changing the composition of the substance

physical

True

False

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3 The weighted average of the atomic masses of an element's naturally occurring isotopes is called the ...

A average atomic number

C ~~average~~ mass number

B average atomic mass

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4 What are counted in an atom to determine mass number?

A neutron

C electron

B proton

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5 What is the atomic number of an element?

- A number of neutrons
- B number of electrons and protons
- C number of protons

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6 Elements are arranged on the periodic table

- A in order of molecular numbers
- C according to atomic mass
- B in order of atomic numbers

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7 A subatomic particle without a charge

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8 A subatomic particle with a negative charge

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9 Two or more substances uniformly dispersed in a mixture

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10 A solution of two or more metals

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11 Two or more substances that are not combined chemically

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12 The smallest unit of an element that maintains all of the elements chemical properties

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13 What forces hold together the atoms in molecules?

- A magnetic fields
- B chemical mixtures
- C chemical bonds

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14 How many atoms of Sodium (Na) are there in the formula for table salt, NaCl?



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15 How many electrons in Iron (Fe)?

26

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16 How many ^{neutron}~~protons~~ in Iron (Fe)?

30

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17 How many protons in Mercury (Hg)?

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18 How many neutrons in Mercury (Hg)?

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